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Undergraduate Neurosurgical Learning Opportunities at Jefferson

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Figure 1

Medical student participants with Dr. Ashwini Sharan, co-director of the hands-on course

Figure 2

Participants showcase their work

On the evening of November 29, 2011, Jefferson's Neurosurgery Interest Group (NSIG) hosted fourteen Jefferson Medical College students for a technical course entitled "Foundations in Neurosurgery" taught by Dr. Ashwini Sharan, Associate Professor of Neurosurgery and Director of the Division of Functional Neurosurgery, and Dr. Joshua Heller, Assistant Professor of Neurosurgery at Thomas Jefferson University Hospital. Additional instructors included Jefferson neurosurgery residents Rohan Chitale (PGY5), Chengyuan Wu (PGY4), and Karl Balsara (PGY2). Stryker MedED provided equipment, models, and instructors Ryan Dugan and Devin Opdendyk (Figure 1).

Dr. Sharan began the course by describing basic principles of neurosurgical pathology, intracranial pressure, clinical decision-making, and assessment tools such as the Glasgow Coma Scale. Upon establishing the fundamentals, Dr. Sharan identified relevant anatomical landmarks used for defining the borders of a skull flap and addressed various surgical techniques to treat intracranial bleeding as well as strategies for creating Burr holes, craniotomies, and craniectomies.

Students practiced many of these techniques on skull models. After learning principles of burr hole placement to create an adequate bone flap, they created burr holes using two different kinds of drill bits, a clutch-operated bit and an acorn bit. Students used the craniotome to connect burr holes and remove bone flaps, and learned to re-attach bone flaps using plates and screws and hydroxyapatite bone cement.

While students worked, Dr. Heller presented a second lecture using preoperative imaging from an actual patient with an extensive subdural hemorrhage secondary to cranial trauma to correlate clinical management. Using the Socratic method, Dr. Heller guided students though determining the patient's Glasgow Coma Scale and proper craniectomy planning and placement. Directly following his presentation, students practiced creating a cranial bone flap on skull models, as if treating the patient presented. This interactive teaching and hands-on approach helped students connect image-based planning with surgical performance. Students also practiced suturing DuraMatrix material, to simulate suturing dura mater.

Finally, students participated in an egg-drilling contest. The objective was to carefully drill the outer shell off of an egg without puncturing the underlying membrane and breaking into the yolk. This exercise forced students to consider the meticulous and delicate skill a surgeon must employ to manipulate fragile anatomical structures.

The course was the first of its kind at Jefferson and was well attended by 1st, 2nd, and 3rd-year Jefferson Medical College students. Alex Whiting, class of 2014, reflected that "The idea of using a power drill to slowly shave away bone just inches from someone's brain seems daunting, but being able to actually use the drills and get hands-on experience made the idea of becoming a neurosurgeon seem much more attainable." Additionally, Sandra Ho, class of 2014, said, "After watching drilling done in the operating room so many times, it was a lot of fun to finally get to perform similar procedures myself." The course granted students invaluable practice, which will prepare them for clinical neurosurgery rotations.

The Foundations of Neurosurgery course supported the overall mission of NSIG, a student-run group created in 2010, to further medical student knowledge of neurosurgical procedures and to provide opportunities for medical students to connect with neurosurgery attendings and residents. A similar hands-on event was hosted in early 2011 that focused on endovascular neurosurgery and was taught by Dr. Pascal Jabbour, Assistant Professor of Neurosurgery at Jefferson. NSIG plans to host another hands-on course for medical students this spring.

The course also supported the Jefferson Neurosurgery Department's mission to educate future neurosurgeons and train future educators. It gave attending physicians the opportunity to inspire a new crop of interested medical students to consider neurosurgical careers. At the same time, it gave neurosurgery residents an opportunity to share their wisdom with medical students and hone their teaching skills.

Finally, the event speaks volumes about Stryker's commitment to education. While practical learning sessions for attending physicians and residents are commonplace, it is rare for a surgical company to devote time and resources to medical student education.

We thank the Jefferson Department of Neurological Surgery and Stryker Medical Incorporated for making this event so successful!

Figure 3

Mastering the drill

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